## Space Weather Forecast

Issued on Thursday, 05 January 2023 at 01:27 Local

**This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales**

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**Space Weather Forecast Headline: Chance of Moderate solar activity throughout. Chance of G1/Minor Geomagnetic Storm intervals on 05 and 06 January.**

**Analysis of Space Weather Activity over past 24 hours**
**Solar Activity:** Solar activity has been Low, with occasional C-class flares. The largest of these was from a sunspot region in the southwestern quadrant of the Sun and led to a possible CME (coronal mass ejection). The remaining four regions are all either stable or fading, with one now having rotated off the visible disc. On the southeastern edge of the Sun, a sunspot which is suspected of producing significant farsided activity is slowly rotating into view. Two CMEs from the southern hemisphere have been identified on satellite imagery as being potentially Earth-directed components and will be analysed when sufficient imagery is available.

**Solar Wind / Geomagnetic Activity**: Solar winds demonstrated the signature of a CME passage, reaching elevated values before a decline to background levels later in the period. Magnetic field started moderate but soon rose to mainly strong levels due to the influence of the CME on the Earth's magnetic field. The north-south component became sharply and moderately negative due to the arrival of the CME and slowly returned to a strong positive orientation during the period. Geomagnetic activity started mainly Active to G1/Minor Strom, with two storm periods early on 04 January, but has since been Quiet to Unsettled.

**Energetic Particles / Solar Radiation:** The count rate of energetic particles (high energy protons) was at background with no solar radiation storms occurring.

**Four-Day Space Weather Forecast Summary**
**Solar Activity:** Solar activity is likely to be mainly Low, but with an increasing chance of both Moderate-class and Strong-class flares through the forecast period.

**Solar Wind / Geomagnetic Activity:** The effects of a CME which arrived at Earth on 04 January are expected to subside through 05 January. A further CME may then glance the Earth on 05 or 06 January, but with low confidence. Fast solar winds are then expected to affect the Earth during 05 January, possibly giving slightly elevated or elevated solar winds. These speeds are likely to ease slowly by 07 and 08 January. There is a chance of G1/Minor Storms on 05 January, with these again possible on 06 January. A return to Quiet to Unsettled conditions are then possible through 07 and 08 January.

**Energetic Particles / Solar Radiation:** The count rate of energetic particles (high energy protons) is forecast to remain at background with no solar radiation storms occurring. However, there is a slight chance of these rising in response to any larger flares that may occur, and perhaps exceeding the S1/Minor Radiation storm level.

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Met Office

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**Geomagnetic Storms:**

| Geo-Magnetic Storm Probability (Exceedance) | Level | Past 24 Hours (Yes/No) | Day 1 (00-24 UTC) (%) | Day 2 (00-24 UTC) (%) | Day 3 (00-24 UTC) (%) | Day 4 (00-24 UTC) (%) |
|---|---|---|---|---|---|---|
| Minor or Moderate | G1 to G2 | Yes | 40 | 20 | 5 | 1 |
| Strong | G3 | No | 1 | 1 | 1 | 1 |
| Severe | G4 | No | 1 | 1 | 1 | 1 |
| Extreme | G5 | No | 1 | 1 | 1 | 1 |

**Radio Blackouts - X Ray Flares:**

| X Ray Flares Probability | Level | Past 24 Hours (Yes/No) | Day 1 (00-24 UTC) (%) | Day 2 (00-24 UTC) (%) | Day 3 (00-24 UTC) (%) | Day 4 (00-24 UTC) (%) |
|---|---|---|---|---|---|---|
| Active | R1-R2 M Class | No | 40 | 50 | 50 | 50 |
| Very Active | R3 to R5 X | No | 5 | 10 | 10 | 10 |

**Solar Radiation Storms - (High Energy Protons):**

| Radiation Storms Probability (Exceedance) | Level ($cm^{-2}$ $sr^{-1}$ $s^{-1}$) | Past 24 Hours (Yes/No) | Day 1 (00-24 UTC) (%) | Day 2 (00-24 UTC) (%) | Day 3 (00-24 UTC) (%) | Day 4 (00-24 UTC) (%) |
|---|---|---|---|---|---|---|
| Active | ≥ S1 | No | 5 | 10 | 10 | 10 |
| Very Active | ≥ S3 * | No | 1 | 1 | 1 | 1 |

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

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